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USE OF ^{7}Be TO ESTIMATE THE IMPACT OF NO TILLAGE ON SOIL ERODABILITY RESISTANCE

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The author of the paper supports the establishing the agricultural conservation practices for soil protection in Chile. In this sense, the ^{7}Be method represents a very sensitive and useful technique to document soil erosion associated to the burning of crop residues.

Key words: soil erosion, ^{7}Be method, soil resistance.

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УРАХУВАННЯ ЯДЕР ^{7}Be ПРИ ОЦІНЦІ ВПЛИВУ НЕОРАНОЇ ЗЕМЛІ НА ЕРОЗІЙНУ СТІЙКІСТЬ ҐРУНТУ

Робота присвячена вивченню методів захисту та збереження ґрунтів Чілі. Пропонується метод, заснований на використанні ^{7}Be, перевагами якого є швидке розпізнавання та детальний аналіз ерозії ґрунту, яка викликана сгоранням рослинних решток.

Ключові слова: ерозія ґрунту, метод використання ^{7}Be, стійкість ґрунту.

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УЧЕТ ЯДЕР ^{7}Be ПРИ ОЦЕНКЕ ВЛИЯНИЯ НЕПАХАННОЙ ЗЕМЛИ НА ЭРОЗИОННУЮ УСТОЙЧИВОСТЬ ПОЧВЫ

Работа посвящена изучению методов защиты и сохранения почв Чили. Предлагается метод, использующий ^{7}Be, преимущества которого – быстрое распознание и подробнейший анализ эрозии почвы, вызванной сгоранием растительных остатков.

Ключевые слова: эрозия почвы, метод использования ^{7}Be, устойчивость почвы.

In Chile, soil is one of the country's most damaged resources, so much so that it is difficult to find soils that do not show signs of degradation. Seventy-eight percent of the area under study, which corresponds to productive soils, shows signs of erosion ranging from moderate to very severe. Moreover, published studies report that 62 % of Chilean territory is currently subject to desertification processes. This scenario is made even worse by the fact that soils are the only natural resource which is not covered by legislative regulations to orient and ensure the sustainable management of the resource, making it an urgent necessity to have a Soil Conservation Law.

Fig. 1. **Study site under no-till management without burning of crop residues**

In this context, it is necessary establish the best of agricultural conservation practices for protect and soil resistance improving, i.e. recover the capacity of soil for to mitigate the negative effects of degradative processes. This component of environmental sustainability is refers to a system's capacity to continue functioning, unaltered, in the face of a disturbance (any event that results in a significant change, either positive or negative, in an ecosystem's normal model) like soil erosion processes. The impact of a period of heavy rainfall (400 mm month^{-1}) on soil redistribution within an area recently subjected to the burning of the crop residue was estimated using the ^{7}Be method*. The increased amount of net soil loss reflects both increased sediment mobilization and an increase in the efficiency of downslope sediment transfer. Based on the current findings, it would seem that burning of the crop residues in the autumn could promote soil loss during the following rainy season, especially if intense rainfall events occur. Such burning may therefore be an undesirable component of no-till management practices. The impact on the surface soil properties produced by burning is reflected on documented changes in soil density and infiltration rates prior and subsequent burning. These changes generate a water-repellent layer at the soil surface, which facilitates the runoff. This behaviour is associated with the lost on soil cohesion due to the burning of organic matter, generating a condition of the high soil erodability, reducing the soil resistance to support the impact of rain drop. Besides, due to the burning crops residues the soil surface is dominated for an ash cover, this material works as a primary adsorption site for the ^{7}Be proved by the extreme event of precipitation. Consequently, given that the low cohesion of ash and the high soil erodability, the Be^{7} is mobilized associated to the ash and surface soil particles reflecting this mobilization, obtaining the high erosion amount which is documented for the period under no till with burning. In this sense, the ^{7}Be method represents a very sensitive and useful technique to document soil erosion associated to the burning of crop residues. By providing a means of documenting erosion associated with individual events under different tillage systems the ^{7}Be method can provide valuable empirical evidence for use in assessing the efficacy of different soil conservation and sediment control strategies.

Fig. 2. **Study site under no-till management with burning of crop residues**

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